



US Army Corps of Engineers
San Francisco District



San Francisco District Coastal Activities

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CERB Meeting
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- Open Coast
 - Ocean Beach
 - Humboldt Bay
 - Santa Cruz Harbor
- In-Bay
 - Sacramento DWSC
 - SF Bay to Stockton DWSC
 - South SF Bay Shoreline



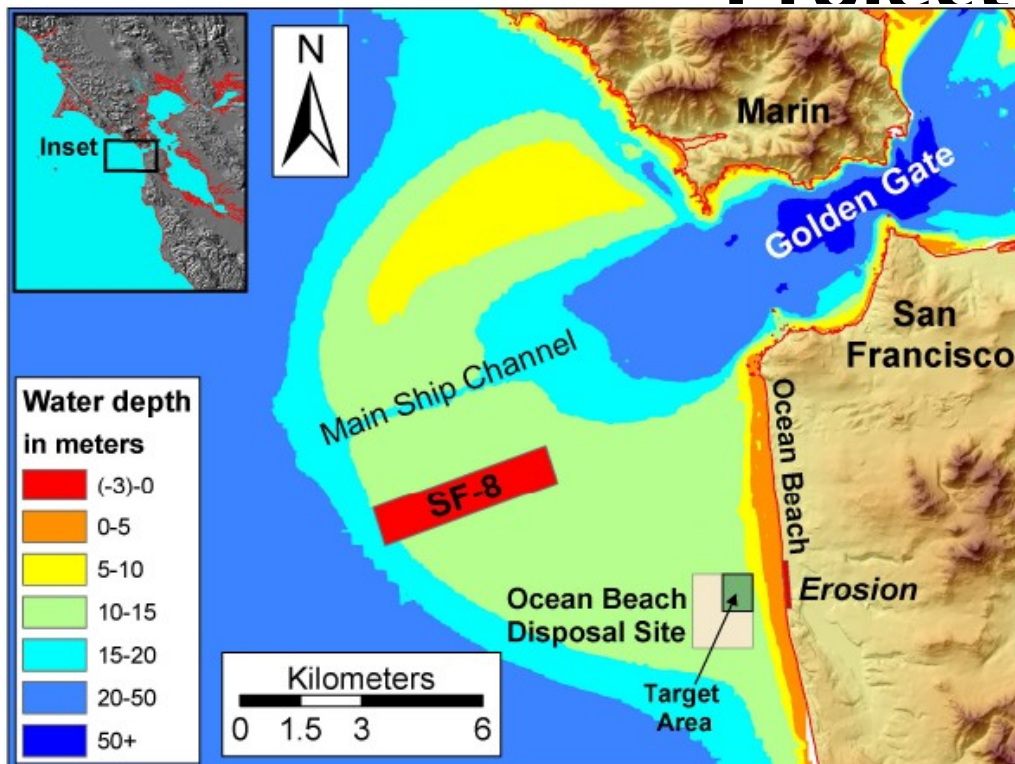
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- Beneficial reuse of dredged material for beach nourishment at Ocean Beach and Humboldt Bay
- Background info / controlling parameters / beach erosion
- O&M dredge disposal activities / available sediment
- Nearshore placement demo projects
- Monitoring programs
- Future nearshore/onshore placement layout development
- Proposed numerical approaches
- Conclusions and recommendations



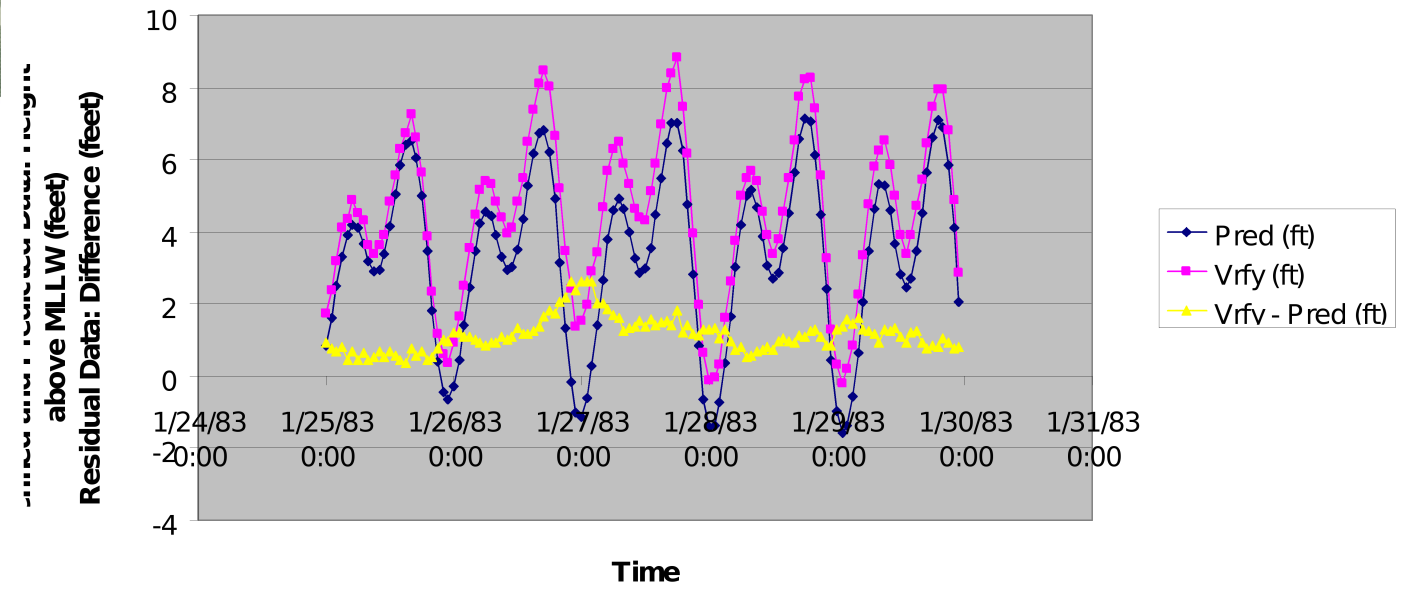
Ocean Beach Onshore Placement Demo Project



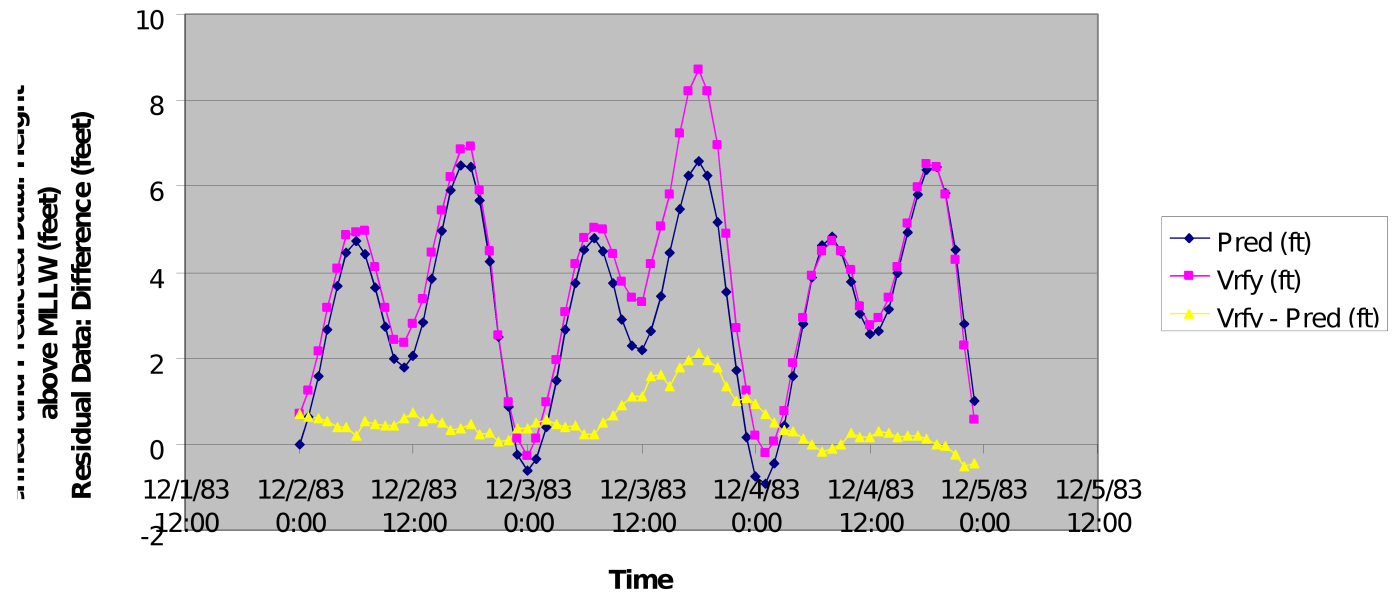
- Tidal range (4' ~ 6')
- El Niño and storm surge (1.5' ~ 2.5')
- Tidal currents (0.1 ~ 1 m/s)
- NW and SW waves (1 ~ 3 m)
- Sea level rise (0.2 m/100 yr)



1983-01-26 to 1983-01-28, SF gage (hourly data)

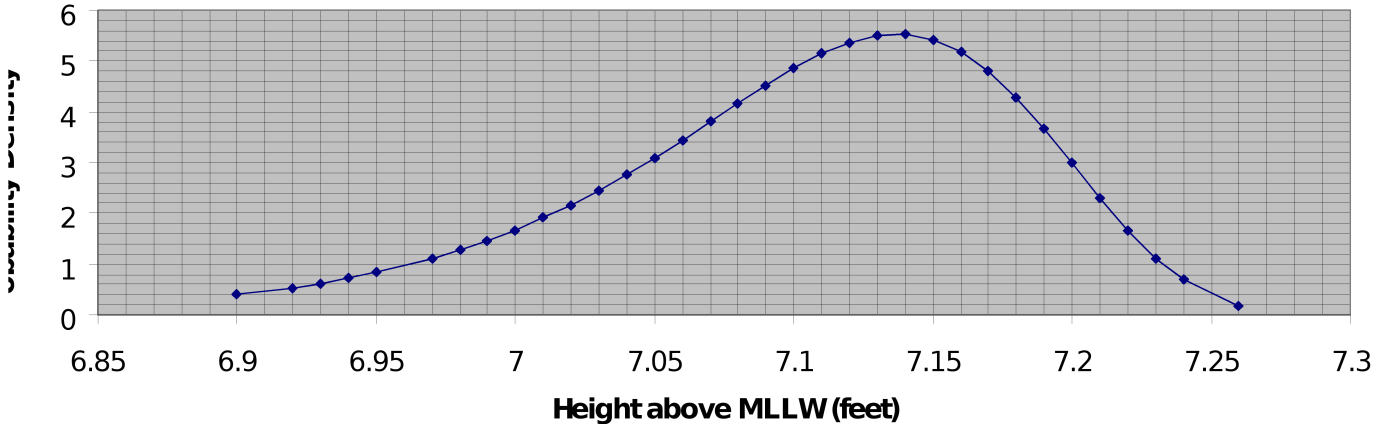


1983-12-03, SF gage (hourly data)

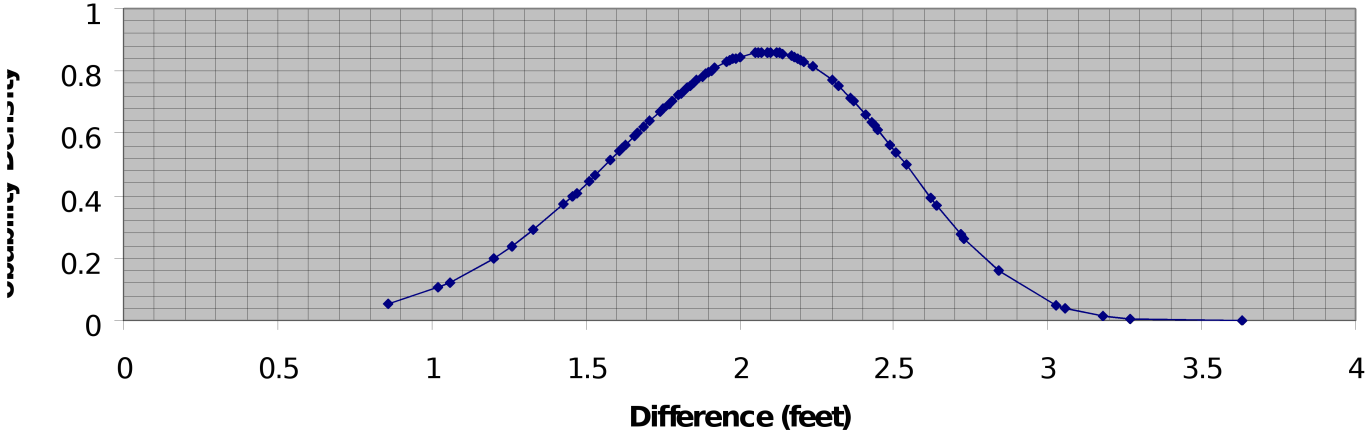




**Weibull Distribution of Annual Peak Hourly Predicted Data, SF
Gage (1901-2005, 105 years)**



**Weibull Distribution of Annual Peak Hourly Residual Data, SF
Gage (1901-2005, 105 years)**

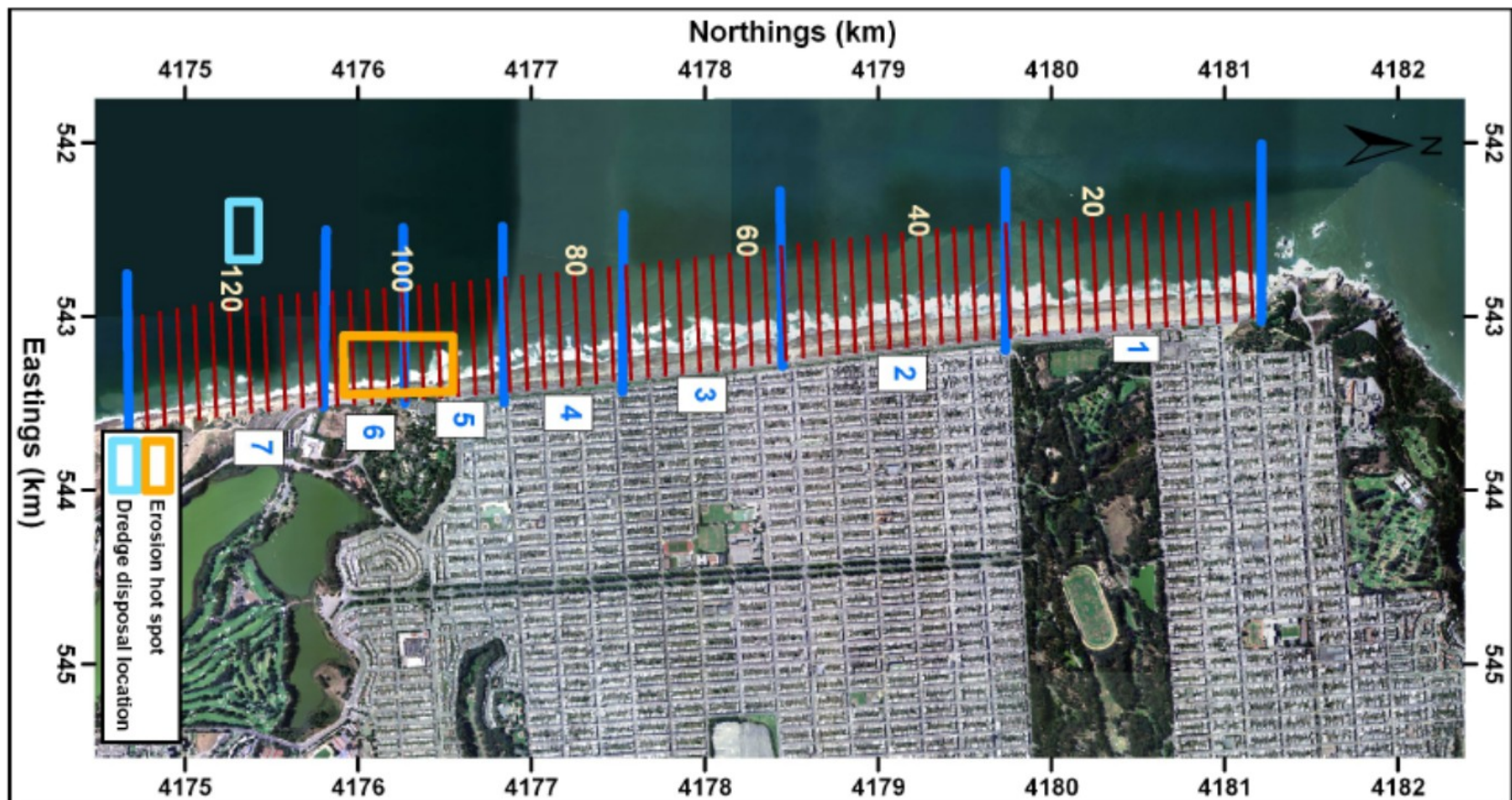




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North Reach, Accretion: + 0 ~ 6 m/yr
South Reach, Erosion: -1 ~ 2 m/yr





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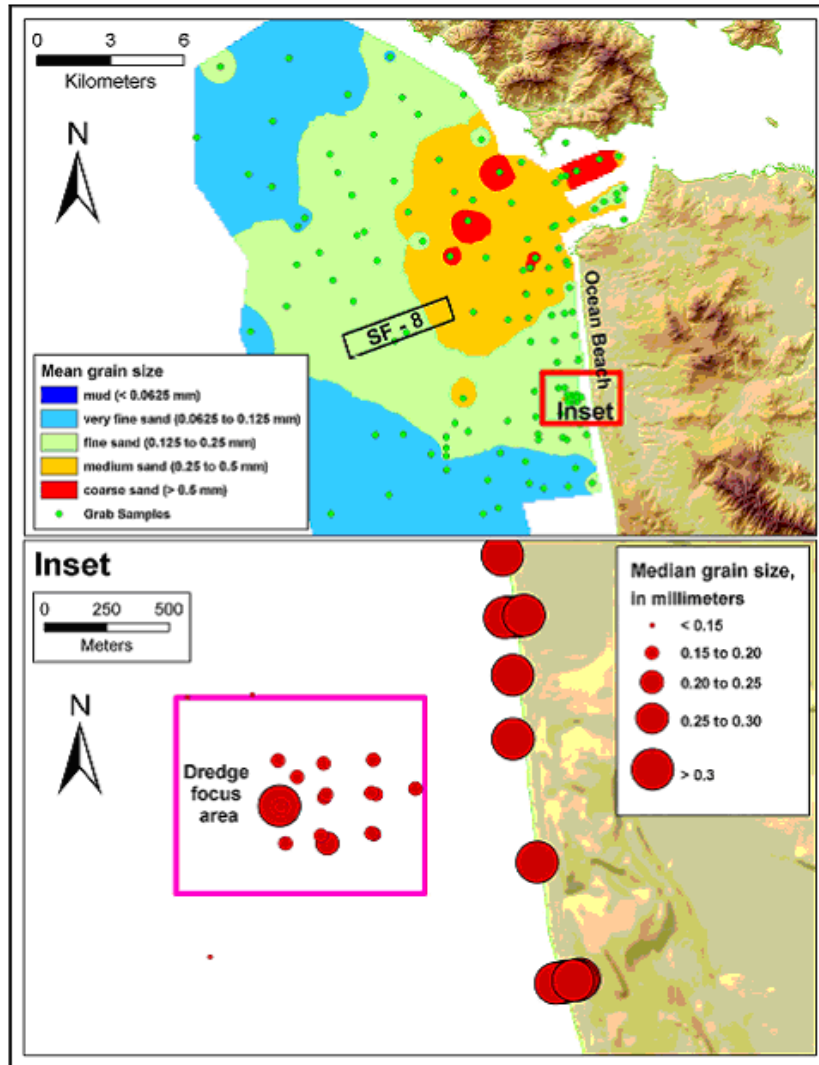


Erosion Spot





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- Available sediment distribution
- Beach sand (~ >0.25 mm)



USACE Nearshore Placement Demo Project

- 2005, 2006, 2007 (May)
- 300,000 cy x 3
- 750 m offshore, 9 ~ 14 m depth
- Expect sediment onshore movement
- Protect beach and outfall

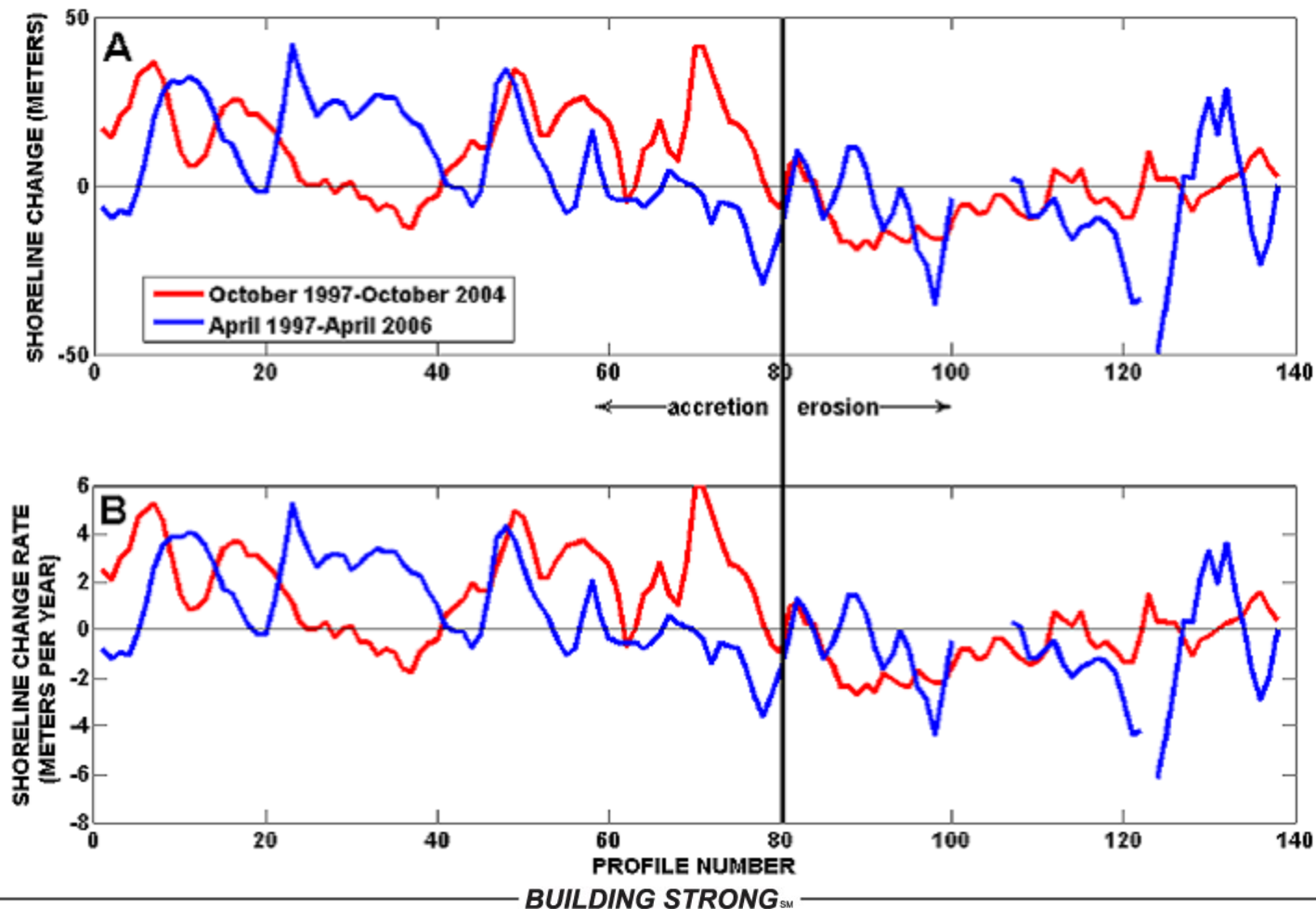


USGS Monitoring Results

- Pre and post sediment placement
- 2005, 2006, 2007 (summer and winter)
- Bathymetry, beach profile, wave, current
- 50% sediment remained at disposal site
- Confirm sediment onshore movement
- Recommend future placement depth < 5 m, including nearshore and onshore placements



Pre-Project Shoreline Changes

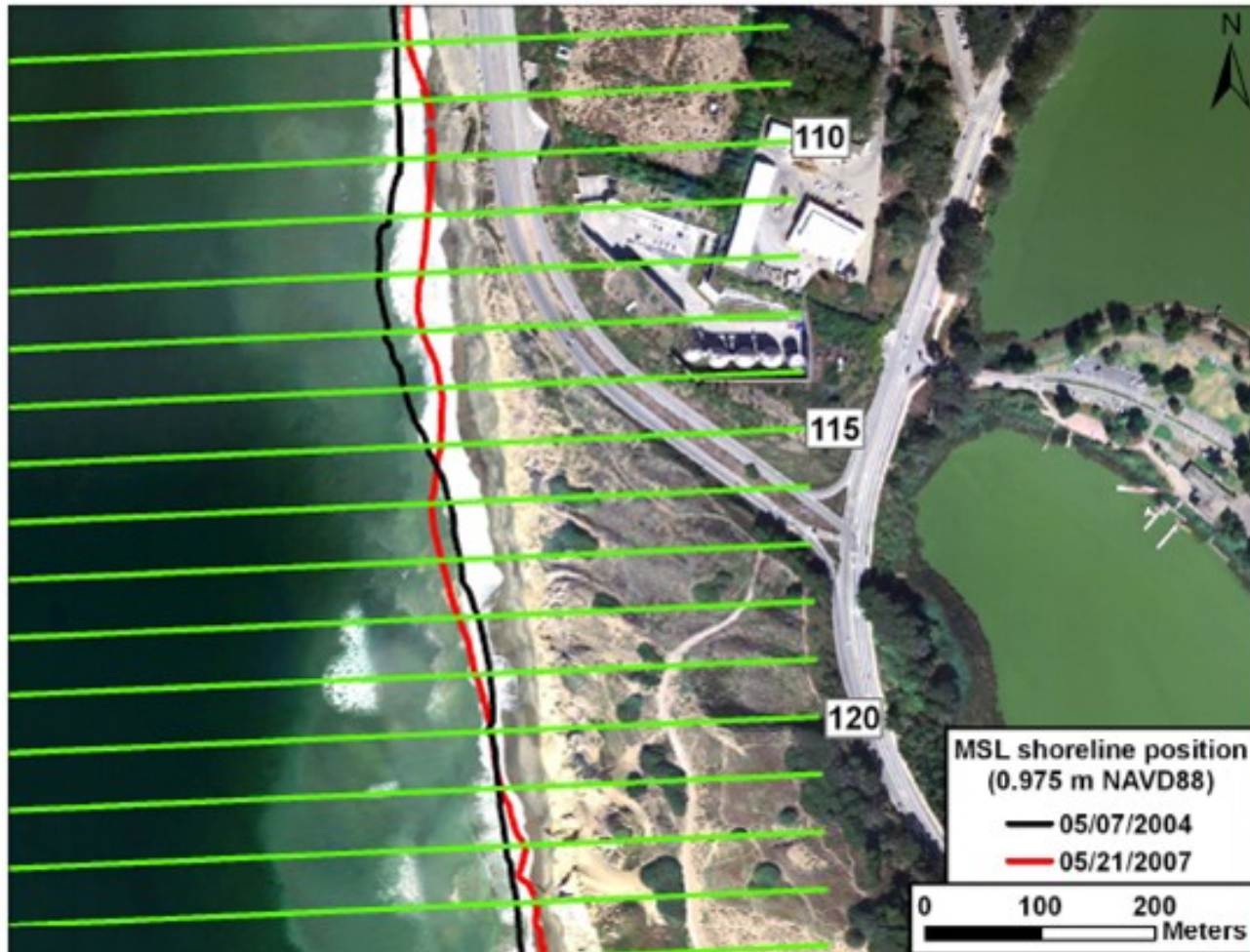




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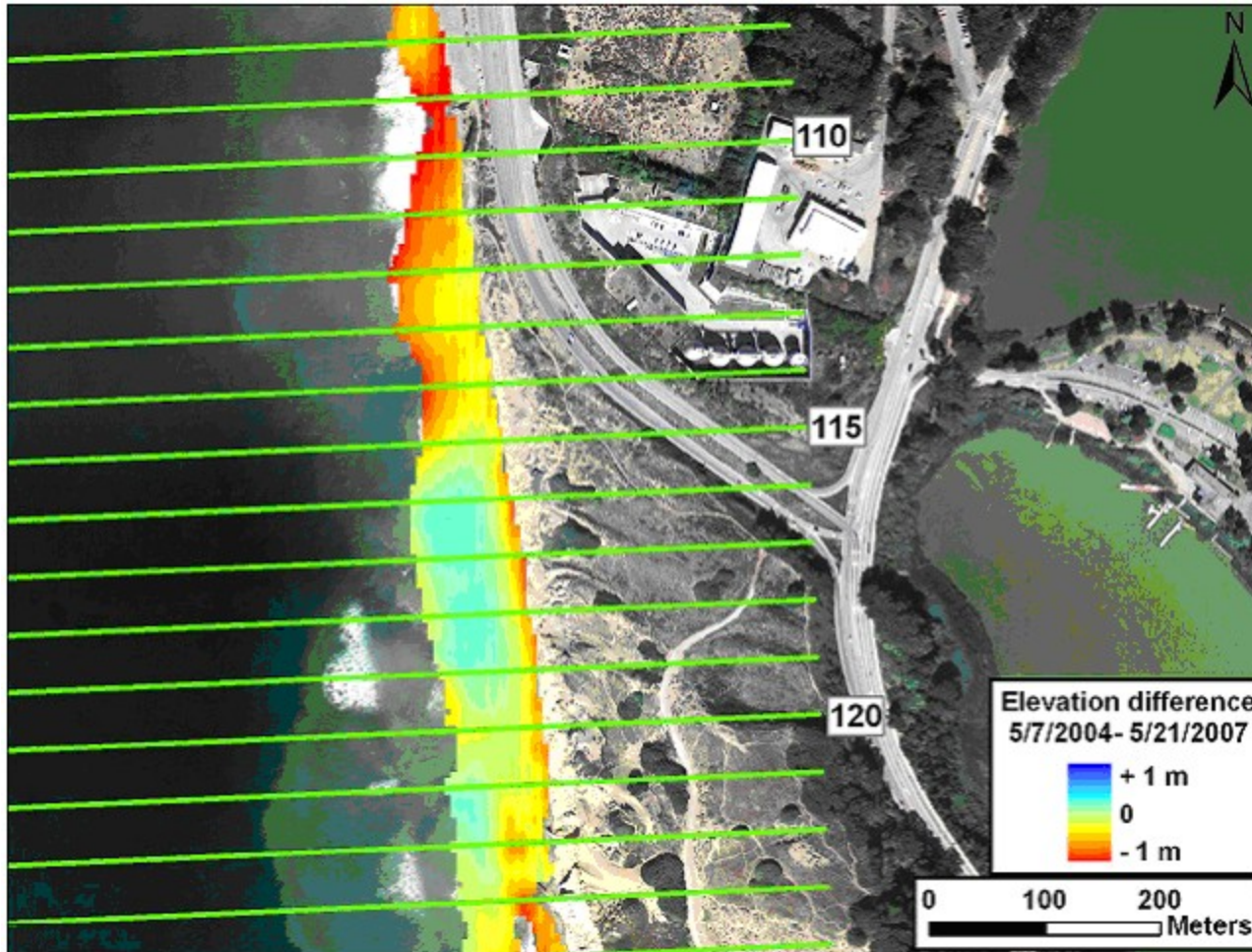


Comparisons / Shoreline Changes



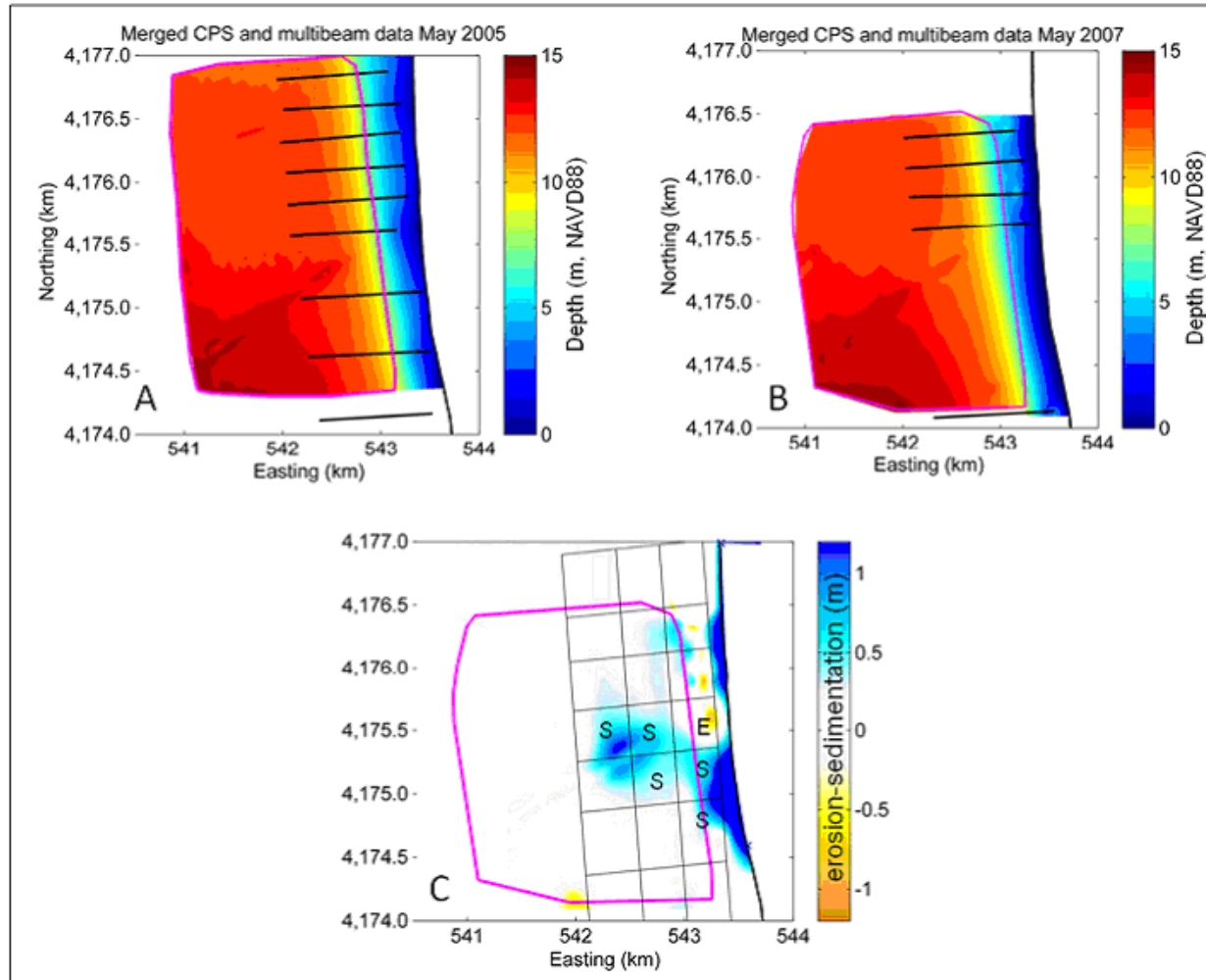


Comparisons / Elevation Changes



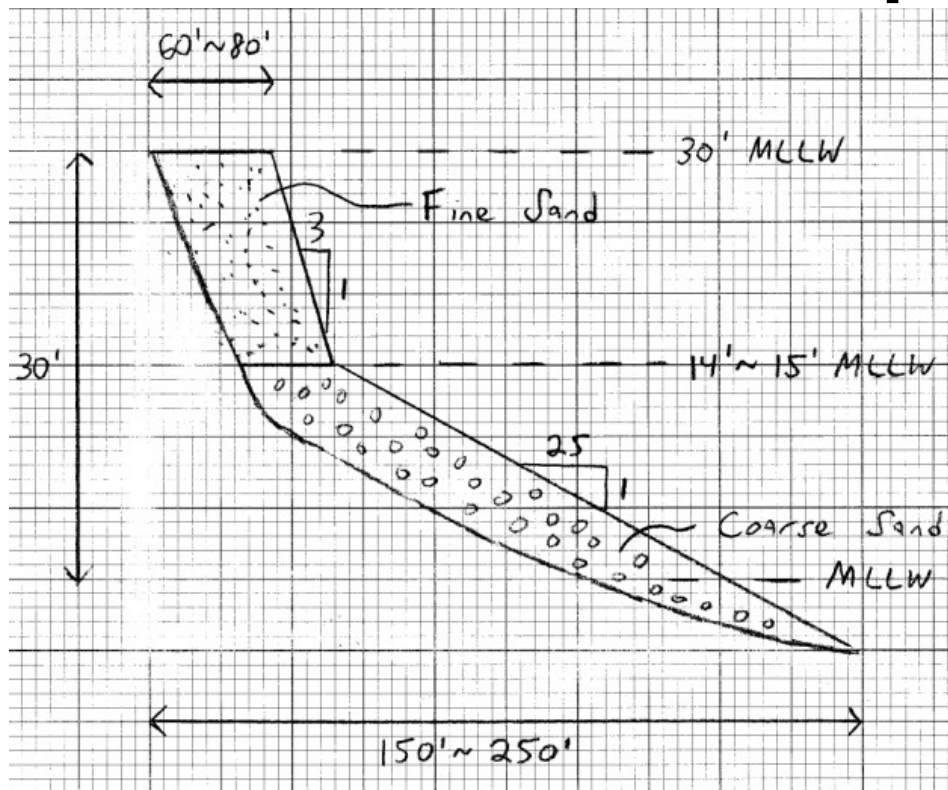


Monitoring Results / Sediment Movement





Conceptual Beach Nourishment Layout Development



- 300,000 ~ 1,000,000 cy onshore placement
- 3,000' length, 30' height, 150' ~ 250' width
- Fine sand dune (1:3 slope)
- Coarse sand berm (water front slope 1:25)

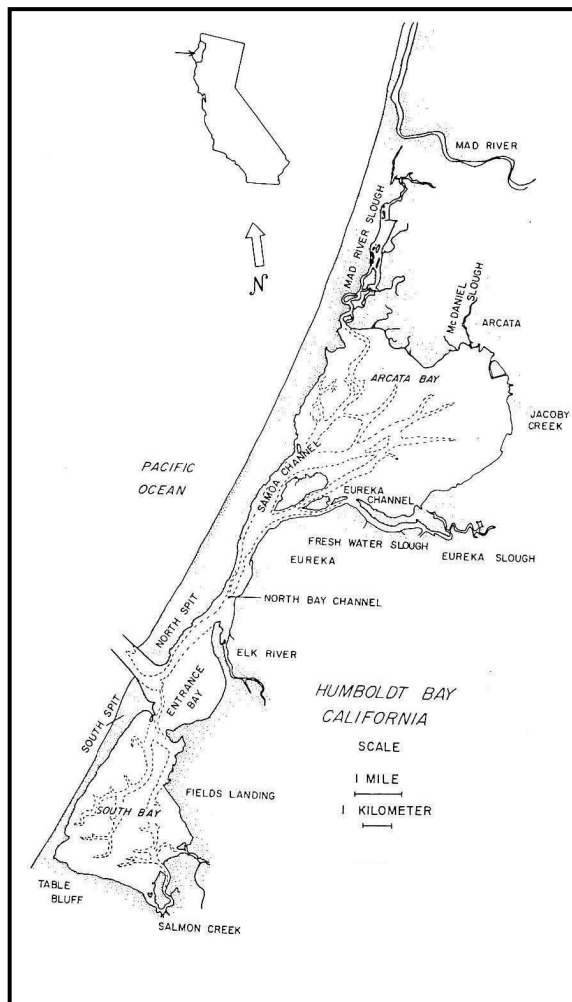


Conclusions and Recommendations for Ocean Beach

- Plan onshore placement demo project
- Prepare a draft report (9/30/09)
- Target construction timeline (summer 2011)
- Numerical modeling (ERDC, CMS-FLOW & CMS-WAVE, tide, wave, longshore and onshore-offshore sediment transport, 2D/3D), (USGS)



Humboldt Bay Nearshore Placement Demo Project



- Develop nearshore placement site
- Lessons learned from Ocean Beach
- Beneficial reuse of dredged material
- Establish monitoring plan
- Proposed numerical approaches



High Energy System



- Swell (NW, winter and summer)
- Wind wave (SW, winter; N summer)
(H: 3 ~ 13 ft; T: 12 ~ 16 s)
- Tidal range (5' ~ 7')
- Tidal current
(1.5 ~ 2.5 ft/s)



Beach Erosion

- USACE aerial photo (1992-2005)
- Erosion of North Spit
- Accretion of South Spit

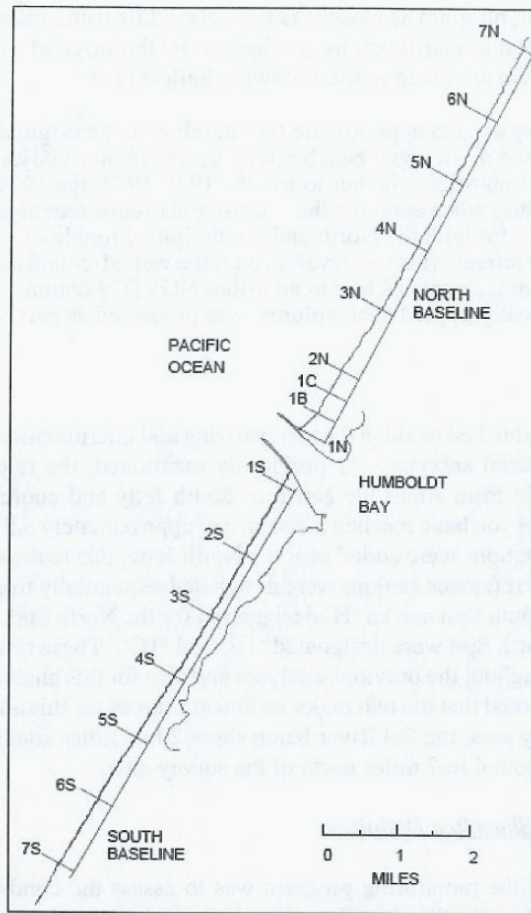


Figure 5. Reference Stations used for Analysis for the Monitoring Program



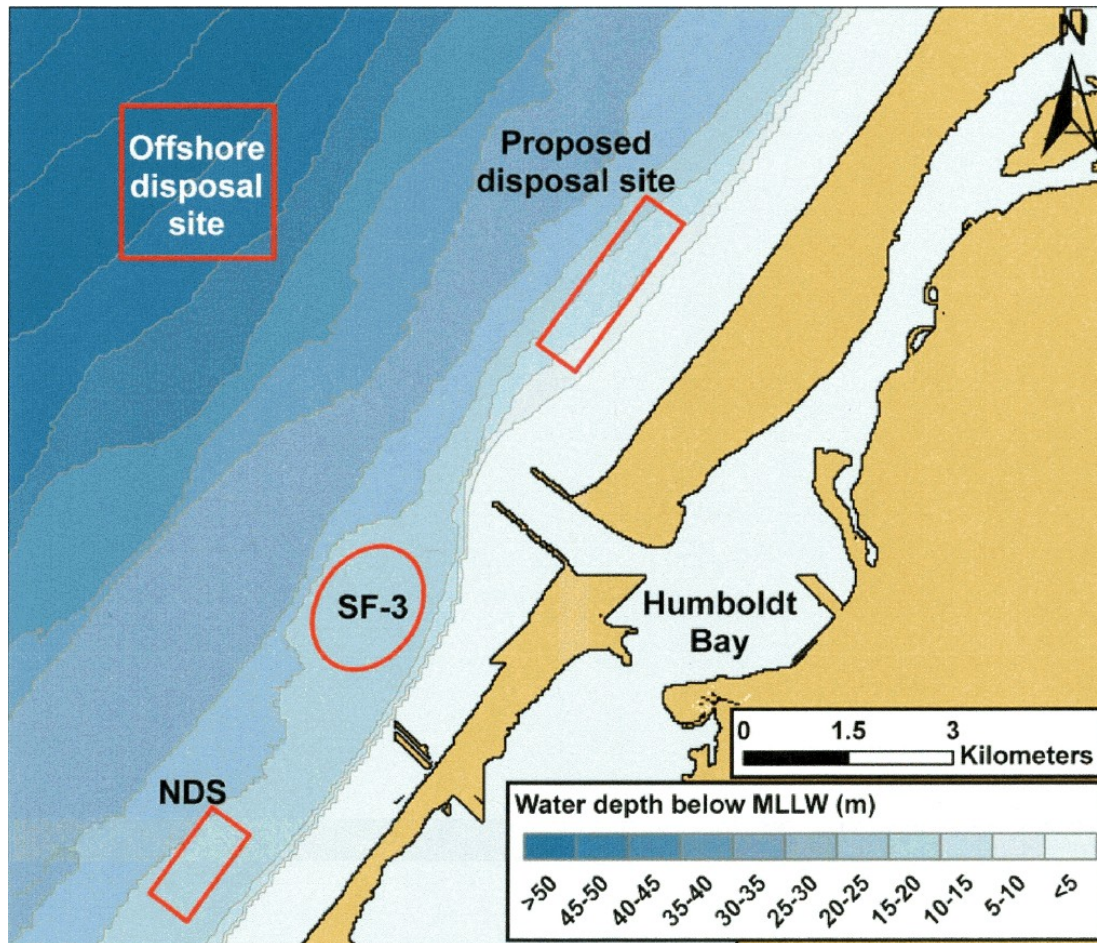
Entrance Channel Maintenance



- USACE Maintained 1881
- Northern, CA
 - 225 mi. N of SF Bay
 - 156 mi. S of Coos Bay, OR
- Deep draft harbor (-48 ft MLLW)
- Annually 1,000,000 cy (>95% sand)



Dredge Disposal Sites Map



- SF-3
1940 ~ 1988
60' ~ 90' depth
- NDS
1988 and 1989
50' ~ 60' depth
- HOODS
> 1989
160~ 180' depth
non-dispersive
50 x 10⁶ cy capacity
(60% left)

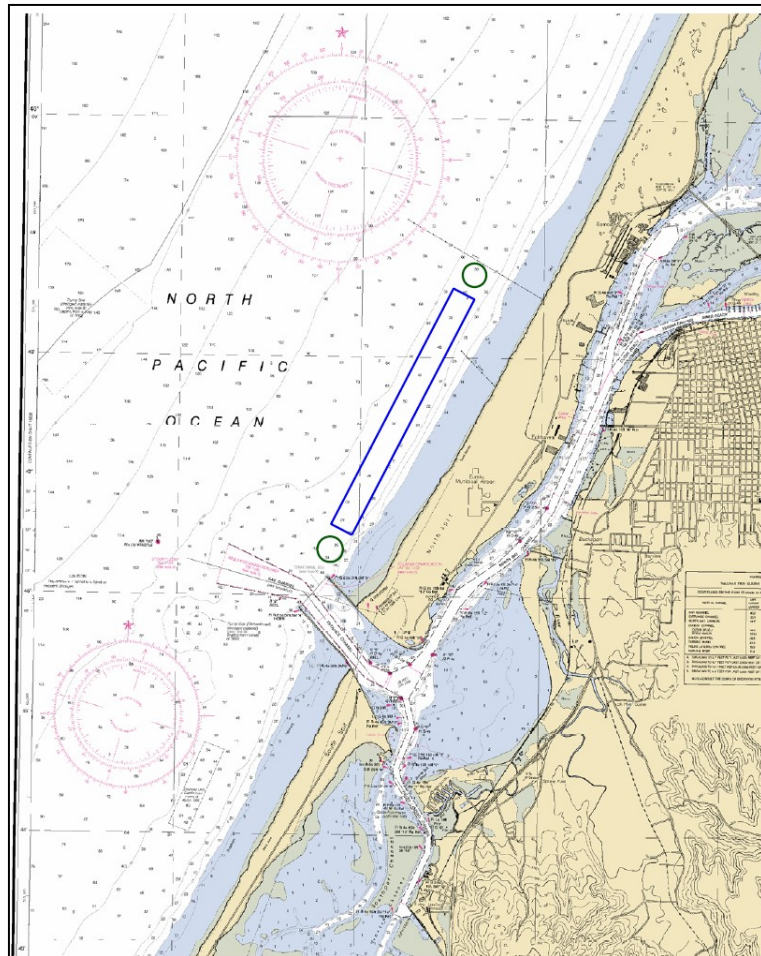


Nearshore Project Benefits

- Nourish north spit
- Increase wave protection
- Reduce dredge disposal at HOODS
 - Maintain littoral cell
 - Reduce maintenance costs
- Improve recreation (surf, beach)
- Restore Habitat (snowy plover)



Proposed Nearshore Demo



Project

- Preliminary development (800,000 ~ 1,000,000 cy placement)
- Area: 3 mi x ¼ mi
- Sediment deposition: ~ 1.0 ft
- 2 control cells (N & S)
- Hopper dredge
Essayons (USACE)



Demo Project Monitoring/Modeling

- Control Cells
 - Sediment samples pre and post placement
 - Biological Survey (crabs)
- Bathymetric Survey

Suggested Future Activities

- Field monitoring program (USGS / local university)
 - Beach response and sediment transport
- Numerical modeling (ERDC)
 - CMS-FLOW and CMS-WAVE



Conclusions and Recommendations for Humboldt Bay

- Lessons learned from Ocean Beach
- Develop field measurement programs / bathymetry survey / monitoring
- Perform numerical analysis / simulation
- Design nearshore placement scheme



Acknowledgements

- USACE-SPN PDT
 - USGS / M&N
 - USACE-SPD

Thank You